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ELECTRONIC APPARATUS HAVING UNIVERSAL HUMAN INTERFACE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based upon and claims the benefit of priority from prior Japanese Patent Application No. 2004-233643, filed Aug. 10, 2004, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electronic apparatus having a universal human interface, and in particular, to improvements in a user interface for a portable information apparatus having a planar display device and a device that allows a user to provide inputs using the user's finger or a stylus.

2. Description of the Related Art

Notebook personal computers, PDAs, cellular phones, and the like are known as typical electronic apparatuses having user interfaces. For example, a conventional notebook personal computer comprises, as a user interface, a display such as a liquid crystal display which displays characters, graphics, and the like on a plane surface, and a keyboard that allows a user to input characters by depressing keys arranged in a predetermined manner, as described in Jpn. Pat. Appln No. 1997-130935. In such a notebook personal computer, the display and the keyboard are held in respective independent housings, which are foldably connected together using hinges. When the notebook personal computer is used, the keyboard is placed on a plane almost parallel to a desk surface by appropriately adjusting the hinge angle of one of the housings to that of the other, both housings being placed on the desk surface. The display is placed so as to face the user. The user can input characters from the keyboard and move a cursor by operating keys on which arrows are printed. A pointing device called a touch pad is provided on the surface of the housing in which the keyboard is installed; the touch pad is located farther from the hinge than the keyboard. The user can move the mouse cursor by touching this pointing device with his or her fingertip. Available pointing devices include a stick system that allows the user to move the mouse cursor by using his or her finger to exert a force on a stick provided near the center of the keyboard.

In general, for portable electronic apparatuses, portability is inconsistent with operability and visibility associated with ease of use. It has thus been desirable to make portability consistent with ease of use. That is, the notebook personal computer is an information apparatus that the user carries with him or her for use. Accordingly, the sizes of the housings are important specification items. Obviously, the display area of the display decreases consistently with housing size. Further, when the notebook personal computer is equipped with a keyboard having a key arrangement and a key number significantly different from the standards, the general-purpose properties of the notebook personal computer are degraded. Consequently, the key pitch of the keyboard decreases consistently with housing size. The consistence between portability and the human interface is very important for the notebook personal computer. Thus, notebook personal computers are classified into a category including what is called full-size notebook personal computers which are inferior in portability and which have large housings, a large screen, and almost the same key pitch as that of desktop

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computers and a category including notebook personal computers having mobile housings which are small and easy to carry out but which have a small-sized screen, a small key pit, and a small touch pad area, that is, an inferior human interface. The user selects the category to which the personal computer the user is to purchase belongs, assuming a situation in which the personal computer is most frequently used. Also in this regard, for portable electronic apparatuses, portability must be compatible with ease of use.

For portable electronic apparatuses, it is desirable to improve the operability of the pointing device. To move the mouse cursor on the screen using the touch pad, the user must move the mouse cursor within a plane much smaller than the screen by moving his or her finger. This pointing device is considered to offer operability inferior to that of a mouse connected to the notebook personal computer and which can be moved to a larger extent than the touch pad in controlling the mouse cursor. Similarly, to move the mouse cursor using the stick, the user must use the force of his or her finger to adjust the movement of the position of the mouse cursor. This pointing device is considered to offer operability inferior to that of a mouse connected to the notebook personal computer and which can be moved to a larger extent than the stick in controlling the mouse cursor.

The mouse, which is externally installed, is easier to operate than the touch pad, which is incorporated into the notebook personal computer because it allows the user to use a larger area than the touch pad. However, disadvantageously, the user must move his or her arm quite a long distance in a horizontal direction from the keyboard, from which the user commonly provides inputs using both hands, to the mouse, which is operated with the user's right or left hand. Further, when it is difficult to operate the computer using the mouse, hardware such as a joy stick or a game pad must be mounted on the computer as an external input device, the hardware being specialized for software. Such hardware may not offer sufficient general-purpose properties and is likely to be infrequently used. Disadvantageously, the cost effectiveness of the device introduced by the user is virtually low. Further, manufacturing many devices infrequently used may lead to contamination of environment and consumption of resources. Also in this regard, the use of such hardware is not preferable.

Notebook personal computers are also commercially available which have an electromagnetic or pressure-sensitive touch panel lying on top of an LCD panel so that direct touch with the screen enables the position on the screen to be input. However, with such a notebook personal computer, when inputting characters, while editing the input characters using the pointing device, the user must frequently move his or her arm a relatively long distance against gravity from the keyboard to the screen. This is disadvantageously inappropriate if both keyboard and pointing device are frequently operated.

Further, such a notebook personal computer enables the user to input characters by displaying a software-based keyboard on the screen and depressing virtual keys. However, the keyboard is almost two-dimensionally placed on a desk surface, and the display surface is placed at an angle with the desk surface so as to face the user. As is easily understood from this arrangement, the angle of a plane suitable for input is different from that of a plane suitable for viewing. There is a limit to the improvement of the input environment based on the addition of the touch panel function to one display.

Moreover, it is desirable to adapt the portable electronic apparatus to a particular situation so that the apparatus can be used easily in that situation. In general, the keyboard arrangement is specified. Accordingly, when the keyboard is utilized for a particular task, the fixed arrangement may disadvantageously